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THE NAVY ACTIVITIES PREFERENCE BLANK AS A PREDICTOR OF REENLISTMENT

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SUMMARY AND CONCLUSIONS

Problem

The low retention rate of enlisted men remains a major problem to the
Navy. The purpose of this research is to evaluate an interest test,
the Navy Activities Preference Blank (NAPB), as a predictor of
retention for use in selection and classification.

Background and Requirements

Previous attempts to relate the NAPB to retention had used the original
theoretically derived scales. The present study employed newly constructed
empirical keys specifically designed to predict retention. Several new
methods of using the original keys were also investigated.

Approach

Retention information obtained from personnel records was used to
classify samples of mechanical (N = 1119) and electrical-electronic
school graduates (N = 2914) into non-reenlistees or first-term
reenlistees. Item-analyses contrasting these low- and high-criterion
samples were used to construct two empirical keys, one for the
mechanical and one for the electrical-electronic sample. In a
further phase of the study, NAPB scales previously constructed through
factor analyses were tried, using the General Classification Test (GCT)
as a moderator variable. An attempt was also made to predict reen-
listment through the analysis of the pattern of highest and lowest
factorially-derived scores.

Findings, Conclusions, Recommendations

When applied to cross-validation samples, the empirically derived
keys did not predict retention. Both analyses involving the original
scales similarly provided no usable prediction of retention.

On the basis of these results, it was concluded that NAPB scales are
not promising predictors of retention. Possible reasons for this lack
of positive results were advanced and suggestions for further attempts
to predict retention, using a different type of vocational interest
test, were made.

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TABLES

THE NAVY ACTIVITIES PREFERENCE BLANK AS A PREDICTOR OF REENLISTMENT

A. PURPOSE

The present report describes several attempts to employ occupational interest scales to identify for "A" school training those enlistees most likely to remain in the Navy. The Navy Activities Preference Blank (NAPB) was used as the item source for these interest scales. The original factor-derived NAPB keys have been found ineffective in directly predicting retention (Steinemann, 1963). Two new keys were empirically constructed to predict retention for enlisted men in mechanical and electrical-electronic ratings. A method of using an aptitude test, the General Classification Test (GCT), as a moderator variable was explored, as was a procedure based on use of each man's highest and lowest interest scores.

B. BACKGROUND

The NAPB is an interest test designed for use with Navy recruits. It contains 40 item triads in which each alternative is a task or job duty in the Navy. The triad format presents a set of three tasks such as:

		Best	Least
a.	Develop and print photographs	||	||
b.	Sell stamps in a post office	||	||
c.	Bake bread, pies, and cakes	||	||

The respondent must select the one task liked best and the one liked least.

The original scoring of the NAPB items, based on factor analytic methods, provided scores on five ipsative scales which encompassed the majority of Navy ratings (Gordon, 1960):[1] Hazardous Duty, Mechanical, Electrical-electronic, Medical-dental, and Clerical. These scales, though intended to predict "A" school achievement, were later found not valid for this purpose (Alf, Gordon, Rimland & Swanson, 1962). Further, a study showed that reenlistment was also not predicted with these scales (Steinemann, 1963). Recent work has suggested that ipsatively scored instruments, such as the NAPB, may in general be very inefficient as

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[1] An ipsatively scored test provides a profile for each person which allows comparison of several measures within the person, but does not permit valid comparisons of scores from one person to another (Smith, 1965).

predictive devices (Smith, 1965). To overcome the psychometric disadvantages of ipsative scales, the construction of empirical keys from the NAPB to predict the above criteria was indicated. The present study sought to develop such scales for predicting the reenlistment criterion within mechanical and electrical-electronic ratings. A second purpose of the study was to determine if the disadvantages of the ipsative scales could be overcome by employing the scales on subgroups of similar aptitude, using a verbal aptitude test as a moderator.

C. PROCEDURE

1. Sample

The sample consisted of 4,033 recruits who had been administered the NAPB three weeks after entering the Navy. Approximately two-thirds of the men later received "A" school training in electrical-electronic ratings, and one-third were trained in mechanically oriented ratings. Table 1 gives the number of men in each rating.

2. Criterion

A reenlistment criterion was obtained for each man by searching enlisted naval personnel records. For the total sample (N = 4,033), 517 first-term reenlistees (13 per cent) were identified. The remainder were classified as non-reenlistees. Of the 517, there were 157 in the mechanical ratings, while 360 were in electrical-electronic ratings.

3. Predictors

a. Empirical keys. Within each sample, i.e., mechanical and electrical-electronic, two-thirds of the men were randomly selected for key construction. The responses of the low criterion, or non-reenlistee, group, were compared with those of the high criterion group. All responses having a difference between groups of eight per cent or greater were selected for the scoring keys. With this criterion, the mechanical reenlistment key contained 20 item responses and the electrical-electronic reenlistment key contained nine item responses.

b. Moderator analysis. For both samples, scores on the five factorially pure ipsative scales were available. Since previous research had shown these scales to be ineffective when used alone, a moderator variable approach was tried. It was hypothesized that the more intelligent recruits might be better informed about the Navy, thereby making their job preference statements more accurate. To test this hypothesis, the sample was divided into thirds (designated as High, Middle, and Low) on the GCT. Correlations between the original NAPB scales and retention status were then computed.

TABLE 1

Numbers of Reenlistees and Non-reenlistees
by School Assignment

School	Reenlistees	Non-Reenlistees	Total
Mechanical Schools			
Machinist's Mate (MM)	91	491	582
Engineman (EN)	47	202	249
Machinery Repairman (MR)	19	269	288
	157	962	1119
- -			
Electrical-electronic Schools			
Interior Communications Electrician (IC)	42	241	283
Fire Control Technician (FT)	178	1416	1594
Electronics Technician-Radar (ETR)	69	407	476
Radarman (RD)	71	490	561
	360	2554	2914

c. Extreme score analysis. With the intention of reducing the effects of ipsativity, a further analysis related highest and lowest scale score to the reenlistment criterion.

D. RESULTS AND DISCUSSION

1. Empirical Scales

The empirical scales were used in obtaining scores for the key construction and cross-validation samples of the mechanical and electrical-electronic groups. Tables 2 and 3 present means, standard deviations, and point biserial correlations of these scores with the reenlistment criterion, as well as percentage overlap values between the high and low criterion samples. The differences between the means of the cross-validation samples were not statistically significant. These data indicate that empirically derived NAPB scales do not discriminate between reenlistees and non-reenlistees for either the electrical-electronic ratings or the mechanical ratings.

2. Moderator Analysis

Scores on the appropriate ipsative scale were also obtained for the above groups. After splitting the sample into Low, Middle, and High GCT thirds, means and standard deviations were computed and are presented in Table 4. Table 5 shows the correlations between the scales and retention status. Once again, it appears that NAPB scales, this time ipsative, do not correlate with retention.

3. Extreme Group Analysis

Since ipsative measures provide scores that are relative to the level of other scores for the same person, they cannot legitimately be used to assess differences between individuals. Consequently, the meaning of correlations between the ipsative scales and the retention criteria is seriously limited. To avoid this problem, a procedure was employed to provide more meaningful comparisons between individuals. For each group a sample of 100 reenlistees and 100 non-reenlistees was randomly selected from the total sample, and each man's highest scale score was noted. The relationship between highest scale score and retention status could thus be determined without violating the meaning of ipsative scores. Table 6 provides the percentage of men in each criterion group obtaining their highest score on each scale. The number of men having highest score on the appropriate scale is underlined.

While this analysis clearly shows that men assigned to specific areas most often score highest on the relevant scale, "highest score" does not relate to retention status. The relationship between lowest score and retention was also investigated in the same way. These data,

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TABLE 2

Means, Standard Deviations and Validities of NAPB Empirical Reenlistment Scale for Electrical-Electronic Sample

Sample	N	$\overline{X}$	S.D.	r_{pb}	Percent Overlap
Key Construction (9-items)					
Low Criterion	1702	-.47	2.34	.19	85
High Criterion	241	.42	2.27		
Cross-Validation					
Low Criterion	852	-.47	2.32	.06	95
High Criterion	119	-.14	2.42		

TABLE 3

Means, Standard Deviations and Validities of NAPB Empirical
Reenlistment Scale for Mechanical Sample

Sample	N	$\overline{X}$	S.D.	r_{pb}	Percent Overlap
Key Construction (20-items)					
Low Criterion	643	-3.42	3.02	.29	76
High Criterion	103	-1.48	3.39		
Cross-Validation					
Low Criterion	319	-3.47	3.21	-.03	102[a]
High Criterion	54	-3.65	2.69		

Note --

[a]Reversal in validity is shown by overlap exceeding 100 per cent.

TABLE 4

Mechanical and Electrical-Electronic Sample Means and Standard Deviations on Original (Ipsative) Factorial NAPB Scales

| | | SCALE | | | | | | | | | |
| | | Hazardous Duty | | Medical-Dental | | Mechanical | | Electrical-Electronic | | Clerical | |
Sample	N	$\bar{X}$	S.D.	$\bar{X}$	S.D.	$\bar{X}$	S.D.	$\bar{X}$	S.D.	$\bar{X}$	S.D.
Mechanical											
GCT-Low	341	27.29	9.68	8.99	6.81	35.77	7.66	31.27	8.64	15.17	7.49
GCT-Middle	381	30.92	9.40	7.86	6.14	36.52	7.15	31.03	8.22	13.10	7.48
GCT-High	397	32.15	8.31	7.21	5.56	37.59	6.56	31.01	7.86	11.69	6.59
Total	1119										
Electrical-Electronic											
GCT-Low	1033	28.36	9.72	9.57	7.34	25.54	7.71	40.20	8.25	15.54	9.41
GCT-Middle	912	29.63	9.05	9.62	7.62	24.67	8.00	41.11	7.75	14.27	8.88
GCT-High	969	30.07	8.66	10.73	8.08	23.75	8.19	41.83	7.18	13.26	9.22
Total	2914										

TABLE 5

Point Biserial Correlations Between NAPB Original Scales and Retention Status
For Moderated Aptitude Groups

Sample	N	SCALE				
		Hazardous Duty r	Medical-Dental r	Mechanical r	Electrical-Electronic r	Clerical r
Mechanical						
GCT-Low	341	-.04	.07	-.09	.01	-.07
GCT-Middle	381	.08	.05	-.11	-.07	.07
GCT-High	397	.02	-.05	.01	.05	-.06
Total	1119					
Electrical-Electronic						
GCT-Low	1033	.04	-.01	-.04	-.04	.03
GCT-Middle	912	.06	-.01	.03	-.06	-.06
GCT-High	969	.04	-.01	-.02	-.02	.01
Total	2914					

TABLE 6

Percentages Having Highest Score on Each NAPB Scale

NAPB Scale	Mechanical		Electrical-Electronic	
	Reenlistees (N=100)	Non-Reenlistees (N=100)	Reenlistees (N=100)	Non-Reenlistees (N=100)
Clerical	1	3	5	4
Electrical-Electronic	34	22	<u>72</u>	<u>75</u>
Hazardous Duty	23	19	18	19
Mechanical	<u>41</u>	<u>55</u>	5	2
Medical-Dental	1	1	0	0
Total	100	100	100	100

presented in Table 7, indicate that "lowest score" is also not predictive of retention.

Originally, plans for this study had included the cross-validation of the NAPB empirical reenlistment scales combined with other predictors. However, considering the above failures of the NAPB to predict retention status, it seemed inadvisable to continue with the planned analysis.

The rationale underlying the use of the NAPB in predicting retention is simply that a man interested in the work he is assigned will tend to continue such work (in the Navy) while the person not interested in his work will be more likely to leave the Navy. It was expected, therefore, that a comparison of the NAPB scales or responses of reenlistees and non-reenlistees involved in the same type of activity would show differences. As shown in all three analyses, such differences did not occur.

As in most instances where negative results are found, a variety of possible reasons may be advanced. However, in the present case, one possibility stands out as unique. In the typical assessment of an occupational interest scale, men presently satisfied in their occupations are compared with men who are not members of the occupation. In the

TABLE 7

Percentages Having Lowest Score on Each NAPB Scale

| NAPB Scale | Mechanical | | Electrical-Electronic | |
	Reenlistees (N=100)	Non-Reenlistees (N=100)	Reenlistees (N=100)	Non-Reenlistees (N=100)
Clerical	29	26	25	27
Electrical-Electronic	2	2	2	0
Hazardous Duty	6	8	6	3
Mechanical	1	1	7	5
Medical-Dental	62	63	60	65
Total	100	100	100	100

present case however, separation from the Navy does not always imply a dislike of the work or a desire for change in specific job activities. Many individuals who leave the Navy may seek similar work in a non-military setting. These recruits therefore would not be expected to differ in their task preferences from those who remain. This factor may account for a large part of the failure of the NAPB to differentiate between reenlistees and non-reenlistees.

Again, the negative results may be in fact less negative than they seem. It is impossible to evaluate the effectiveness of the NAPB in a stringent manner, since men are assigned to "A" schools, within the constraints of eligibility and quotas, according to their stated preferences. Consequently, the NAPB cannot be assessed accurately, as would be possible if job assignment were random with respect to preference.

Since the NAPB contains work tasks only, it is possible that an interest inventory covering a broader domain of interests--such as the Strong Vocational Interest Blank (SVIB)--could discriminate the career-prone enlistees from the remainder. This inventory, a commercial test of vocational interests, covers preferences for amusements, hobbies, school subjects, occupations, and types of people, as well as work duties. The SVIB has worked well in identifying career-motivated NROTC officers (Abrahams, Neumann, Rimland & Githens, 1966).

Despite its demonstrated usefulness in professional occupations, it is widely believed that the SVIB is not applicable to skilled and semi-skilled occupational groups. This conclusion is based on studies where the SVIB has been employed to discriminate among types of tradesmen, using a reference group (Men-in-General) composed primarily of professional men. While it was possible to build scales that discriminated between the reference group and tradesmen, these scales did not successfully differentiate between men in differing trades (Strong, 1943). However, since these earlier studies did not employ an appropriate reference group, they do not demonstrate that the SVIB would be inapplicable to tradesmen if proper scale development procedures were used. Analogously, effective discrimination between professional men would not be expected using a reference group composed of tradesmen. (The Navy Vocational Interest Inventory [NVII], which is based on a comparison group of tradesmen [though its item coverage differs from the SVIB] is currently being evaluated at the USNPRA-San Diego.)

These considerations suggest that the SVIB, or a like instrument, might prove to be an effective instrument for the selection and classification of enlisted naval personnel. Scales could be developed through administration of the SVIB to enlisted men who have been in their rating for a considerable period of time. Scales developed from these data, though limited because of their being based on concurrent data, might nevertheless be used in the classification process if intermediate criteria gave promising results. Long term validation should be done several years later as information on the original testees' career status became available.

REFERENCES

Abrahams, N. M., Neumann, Idell, Rimland, B., & Githens, W. H. The Strong Vocational Interest Blank keyed to predict NROTC officer retention. San Diego: U. S. Naval Personnel Research Activity, September 1966. (SRR 67-4)

Alf, E. F., Gordon, L. V., Rimland, B., & Swanson, L. The development and validation of Form 7 of the Navy Basic Test Battery. U. S. Naval Personnel Research Activity, San Diego, Calif. Report No. 202, December 1962.

Gordon, L. V. Development of a new Navy enlisted classification battery. Paper presented at NATO Symposium on Defence Psychology, NATO Headquarters (Porte Dauphine), Paris, France, 27-29 July 1960.

Smith, Lou H. A critique of ipsative measures with special reference to the Navy Activities Preference Blank. San Diego: U. S. Naval Personnel Research Activity, June 1965. (TB 65-16)

Steinemann, J. H. The prediction of reenlistment among Class "A" school trained men. Washington: Bureau of Naval Personnel, September 1963. (TB 63-11)

Strong, E. K., Jr. Vocational interests of men and women. Stanford: Stanford University Press, 1943.

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13. ABSTRACT

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